CHAPTER 2

PROPOSED ACTION AND ALTERNATIVES

2.0 INTRODUCTION

Two alternatives are evaluated in detail in this EA. The Proposed Action is discussed in Section 2.1. The Proposed Action involves 20 production test wells and 2 injection wells (on 20 locations), over three federal mineral leases. The No Action Alternative is discussed in Section 2.2. Other alternatives were considered but eliminated from detailed analysis in accordance with 40 CFR 1502.14. These alternatives and rationale for eliminating them from detailed analysis are discussed in Section 2.3.

2.1 THE PROPOSED ACTION

The Proposed Action is within the administrative boundary of the BLM's Rock Springs Field Office and is located in the north-central part of Sweetwater County, Wyoming. Access to the area is by Interstate Highway 80 and Sweetwater County Road 4-21 (Bar X Road). Figure 2.1, the Proposed Action Map, and Table 2.1 provide information on wells and leases involved.

The lease holder proposes drilling exploratory wells to the Big Red Coal in the Fort Union formation and testing the commercial potential for CBM production of that zone. Two exploratory areas, or pods, are proposed within the Proposed Action area with each pod consisting of 10 exploratory wells on 160-acre spacing and one injection well. These pods are known as the North Sweetwater Pilot (northern pod on Figure 2.1) and the Central Sweetwater Pilot (southern pod on Figure 2.1). The proposed well number and spacing is believed to be the minimum necessary to sufficiently de-water the coal, allow the gas to desorb through reduced pressure in the coal seam, and allow the determination of the zone's commercial production potential in this geographic region. The exploratory Proposed Action is expected to provide additional data about the natural gas resources in this area. Life-of-project is unknown since this project is designed to test the commercial potential for CBM production but could last anywhere from 60 days to 20 years or more should testing prove successful. As more is learned about the resources, Wyoming Oil and Gas Conservation Commission (WOGCC)-specified spacing orders for the area could change if further development is proposed. All applicable permits would be acquired.

All produced water would be disposed of through injection wells drilled into a Fort Union sandstone containing water of lesser or equal quality, as defined by the Wyoming Department of Environmental Quality (DEQ), compared with the injected (produced) water. A number of sandstone lenses are found in this formation and it is expected that more than one would be tested for suitability for this use. Each injection well would be located with a proposed well on a well site location. For more

detail on the technical aspects of the Proposed Action, please refer to Appendix D.

The Proposed Action would also require the construction of access roads, pipelines (most would be buried adjacent to the roads) and related production facilities (well pads, pump jacks, pits, etc.) for each of the pods. The project area, here defined as the sections directly affected by the Proposed Action and enclosed by lease boundaries, encompasses approximately 3,500 acres.

TABLE 2.1
LOWER BUSH CREEK PROJECT WELL INFORMATION

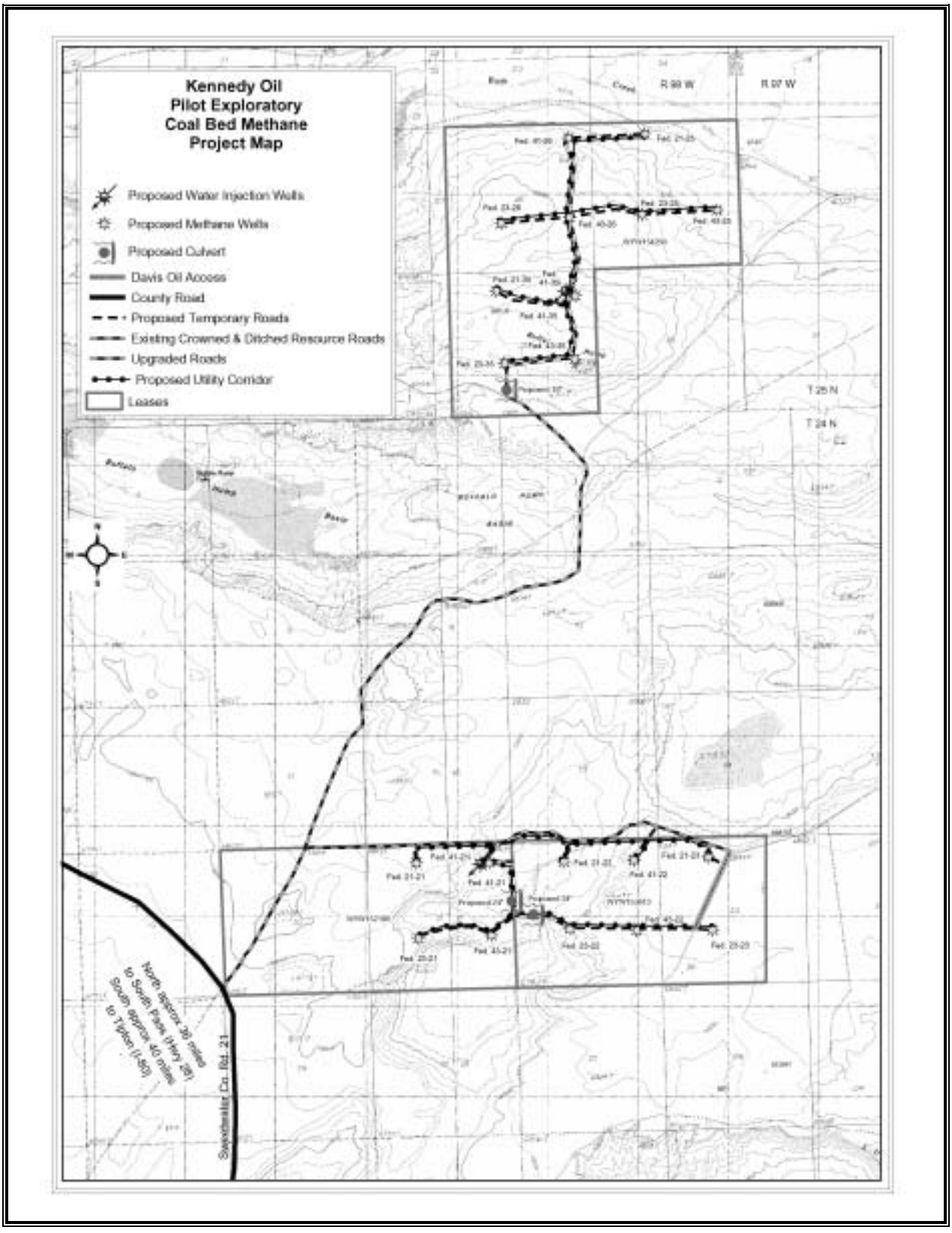
Proposed Action Area	Lease No.	Well Name	Location
North Sweetwater Pilot	WYW154200	North Sweetwater Fed 21-25	NENW Sec. 25, T25N R98W
		North Sweetwater Fed 23-25	NESW Sec. 25, T25N R98W
		North Sweetwater Fed 43-25	NESE Sec. 25, T25N R98W
		North Sweetwater Fed 41-26	NENE Sec. 26, T25N R98W
		North Sweetwater Fed 23-26	NESW Sec. 26, T25N R98W
		North Sweetwater Fed 43-26	NESE Sec. 26, T25N R98W
		North Sweetwater Fed 21-35	NENW Sec. 35, T25N R98W
		North Sweetwater Fed 41-35	NENE Sec. 35, T25N R98W
		North Sweetwater Fed 23-35	NESW Sec. 35, T25N R98W
	Injection well	North Sweetwater Fed 41-35i	NENE Sec. 35, T25N R98W
		Kennedy North SW Fed 43-35	NESE Sec. 35, T25N R98W
Central Sweetwater Pilot	WYW153613	Central Sweetwater Fed 21-22	NENW Sec. 22, T24N R98W
		Central Sweetwater Fed 23-22	NESW Sec. 22, T24N R98W
		Central Sweetwater Fed 41-22	NENE Sec. 22, T24N R98W
		Central Sweetwater Fed 43-22	NESE Sec. 22, T24N R98W
		Central Sweetwater Fed 21-23	NENW Sec. 23, T24N R98W
		Central Sweetwater Fed 23-23	NESW Sec. 23, T24N R98W
	WYW152180	Central Sweetwater Fed 21-21	NENW Sec. 21, T24N R98W
		Central Sweetwater Fed 23-21	NESW Sec. 21, T24N R98W
		Central Sweetwater Fed 41-21	NENE Sec. 21, T24N R98W
		Central Sweetwater Fed 43-21	NESE Sec. 21, T24N R98W
	Injection well	Central Sweetwater Fed 41-21i	NENE Sec. 21, T24N R98W

2.1.1 PRE-CONSTRUCTION ACTIVITIES

Kennedy would follow the procedures outlined below to gain approval for the proposed activities. Development activities also would be approved prior to construction through applicable permit procedures including the filing with the State of Wyoming for appropriate permits for each proposed well. Aquifer exemptions have been obtained for the injection wells from WOGCC. Any other applicable permits would be obtained as necessary prior to construction.

Prior to the start of construction activities, Kennedy would submit and obtain approval of federal Application to Permit to Drill (APD), and any necessary right-of-way applications. A Master Surface Use Plan (MSUP), Master Drilling Plan (MDP), and an Addendum to the Master Surface Use Plan-Comprehensive Transportation Plan (see Appendix D) and the project map (Figure 2.1)

Figure 2.1 PROPOSED ACTION MAP



have been submitted to the RSFO. These documents include site-specific plans describing the proposed development (i.e., drilling plans with casing/cementing program; surface use plans with road and drill pad construction details; and site-specific reclamation plans, etc.). Approval of all planned operations would be obtained in accordance with authority prescribed in Onshore Oil and Gas Order No. 1 (Approval of Operations on Onshore Federal and Indian Oil and Gas Leases).

The proposed facilities have been staked by Kennedy and inspected by an interdisciplinary team and/or an official from the BLM to ensure consistency with the approved RMP and oil and gas lease stipulations.

Table 2.2 provides information on initial and life-of-project disturbance.

TABLE 2.2
LOWER BUSH CREEK PROJECT SURFACE DISTURBANCE SUMMARY

Facility	Length (feet)	Width (feet)	Initial Disturbance (Acres)	Production Disturbance Should Exploratory Drilling Prove Successful (Acres)
Proposed Special Purpose Roads (includes parallel water gathering line)	40267	30 (initial) 12 (LOP)	27.73	11.09
Proposed Utility Corridor (paralleling existing crowned and ditched resource road)	7623	30 (initial) 0 (LOP)	5.25	0
Proposed Utility Corridor (not paralleling roads)	3228	30 (initial) 0 (LOP)	2.22	0
Use of an existing old oil field road	22,436	(initial/ LOP)	0.0	0.0
Proposed Upgraded Roads	2425	30 (initial) 24 (LOP)	1.67	1.34
Each Producing Well Pad (18 pads total)	295 (init.) 175 (prod.)	205 (initial) 175 (LOP)	1.39 (well) 25.02 (total)	0.7 (well) 12.6 (total)
Each Pad for Producing and Injection Well Locations (2 locations total)	455 (init.) 200 (prod.)	205 (initial) 200 (LOP)	2.14 (well) 4.28 (total)	0.92 (well) 1.84 (total)
Total Disturbance			84.66	28.72

2.1.2 CONSTRUCTION AND DRILLING

Following is a general discussion of proposed construction techniques to be used by Kennedy implementing the Proposed Action. These construction techniques would be generally applicable to drill sites, pipelines, and access roads within the project area, but may vary in detail between the individual well sites. Roads and pipelines on BLM-administered public lands constructed in association with the Proposed Action would require BLM right-of-way authorizations and/or Sundry Notices which could include additional mitigation to further minimize environmental impacts.

2.1.2.1 WELL PAD CONSTRUCTION

Well pads would be prepared by clearing an area approximately 295 feet by 205 feet (1.39 acre) for individual wells. Well locations would be cleared of vegetation and topsoil (up to 12 inches), which would be stockpiled for future use in reclamation. The well location would be leveled using standard cut-and-fill construction techniques. The typical well pad would disturb no more than 1.39 acres during drilling operations. Once drilling operations are complete and if production ensues, well pads would be partially reclaimed (for operation purposes) resulting in life-of-project disturbance of 0.7 acres per well. For the purpose of analysis, maximum disturbance is assumed to be 1.4 acres; however, it is Kennedy's practice to keep surface disturbance to a minimum. See Appendix D (pg 108), for a typical well site layout. Should testing prove unsuccessful, the entire well pad and access road would be reclaimed and seeded with native species.

Well pads for locations of an exploratory well and injection well would be an exception to this estimate. The locations of two exploratory wells, the Kennedy Central Sweetwater Fed 41-21 and the Kennedy North SW Fed 41-35, would also be the sites of the two injection wells, the Kennedy Central Sweetwater Fed 41-21i and the Kennedy North SW Fed 41-35i, respectively. Preparation for these locations would include clearing an area 455 feet by 205 feet. Surface disturbance at these locations could be less but no more than 2.14 acres. Should production ensue, unneeded areas of the well pad would be reclaimed resulting in a life-of-project disturbance of 0.92 acres per each production and injection well pad.

Components of the well pad include an earthen reserve pit lined with 12–mil reinforced poly (liner to have a permeability less than 10^{-7} cm/sec. or according to stipulations) to contain drilling fluids, cuttings, and water produced during drilling and completion operations. Venting of any gas produced would be over an unlined emergency pit. These emergency pits are unlined as they serve as backdrop to any flaring necessary for safety during the operations. All pits would be constructed in accordance with BLM requirements. The reserve pits would be approximately 110 feet long by 75 feet wide and 10 feet deep. One side of the pits would be ramped with a 2:1 slope.

The reserve pit would be fenced on three non-working sides during drilling, and the fourth side at the time the rig is removed. Kennedy estimates the reserve pits could be open for up to six months to allow for evaporation of pit fluids. During this time, the pit would be fenced on all sides to prohibit wildlife or livestock from falling into the pit.

Pits would be tested regularly to ensure that water quality meets protection guidelines for wildlife. Any pits with sodium testing at or above 17,000 ppm would be netted with a mesh size sufficient to prevent a sparrow-sized bird from falling through or becoming entangled in the net.

2.1.2.2 ROAD CONSTRUCTION AND TRANSPORTATION

Kennedy proposes to use existing crowned and ditched roads to and within the project area and to construct or create new roads. Establishment or construction of new roads in the North Pilot Area

would total approximately 4.6 miles and inn the Central Pilot Area would total approximately 3 miles. Approximately half of a mile of the existing Davis Oil access road would be used for access in the Central Pilot Area. If drilling is productive, all access roads to the well site would remain in place for well-servicing activities (i.e., maintenance, improvements, etc.) for the life of the well. Reclamation would be completed on segments of the well pads and access roads that are no longer needed following construction activities. The project map (Figure 2.1) indicates road locations and each road type. See Table 2.2 for details on disturbance. Details of the proposed road construction and transportation plan can be found in Appendix D, Master Surface Use Plan and Comprehensive Transportation Plan.

Proposed roads would be established as follows:

- Use of existing Collector Roads (multi-purpose, upgraded roads)
- Construction of Resource Roads to access well roads
- Development of Special Purpose roads to access one or more wells

Special Purpose roads, as defined in Appendix D, would be used to move equipment and personnel onto well sites. Development of such roads would be brush hogged (using a mowing machine to cut brush near the ground without disturbing the soil). Spot upgrading could be implemented in areas by application of gravel 12-foot wide by 4 inches deep. In other areas, "plating" could be utilized and would require combining drilling mud or clay soils with native sand and/or gravel to build up a driving surface (plate base) 2 to 8 inches thick.

Three culverts are proposed for construction on these roads, with two in Section 21 of T24N R98W and one in Section 35 of T25N R98W. Rarely, a spot upgrade of gravel and/or shallow grading would help protect the road from rutting or turn-outs in areas prone to boggy conditions when wet.

An estimate of workforce and traffic for the Proposed Action is found in Table 2.4. Traffic would include:

- Drilling rig/s and associated equipment
- Water trucks for drilling
- Traffic associated with occasional workover activities
- Light truck traffic would include the use of pickup trucks to visit each well daily

Kennedy would prohibit travel during periods when severe rutting (creation of ruts in excess of 4" deep) or resource damage might occur. Snow removal equipment would be equipped with shoes to keep the blade six (6) inches above the natural ground surface. Locations of snow stockpiles, if needed, would be designated in advance by the Authorized Officer.

The locations of the proposed roads have been placed to maximize transportation efficiency. Roads would be closed and reclaimed by Kennedy when they are no longer required for operations, unless otherwise directed by the BLM.

2.1.2.3 DRILLING OPERATION

Drilling of the exploratory wells and injection wells would utilize either a conventional or truck-mounted drilling rig. Additional equipment and materials needed for drilling operations would be trucked to the well site. Water used for drilling would come from an approved water well located in Section 28, T23N, R96W and/or Section 31, T24N, R97W. Approximately 600 barrels of water would be needed for drilling each well. The actual water volume used in drilling operations would be dependent upon the depth of the well and any losses that might occur during drilling. Based on existing hydrogeologic information, groundwater in the coal seams at the completion depths of the proposed CBM wells is hydraulically isolated from shallow groundwater and surface water resources. See Section 1.3 subsection titled "Impacts to Domestic Water Supplies" for further discussion. Refer to Appendix D for specific details on the drilling procedures.

Drilling mud would consist of fresh water, native clays, and bentonite gel. As hole conditions dictate, small amounts of polymer additives and/or potassium chloride salts may be added for hole cleaning and clay stabilization.

Depending on the depth of the coal seam, each producing well would be drilled to a depth of 3,800 feet to 5,000 feet or deeper, and would be exposed to the coal seam through open-hole completion[1]. The well control system would be designed to meet the conditions likely to be encountered in the hole and would be in conformance with BLM and State of Wyoming requirements.

The drilling and completion operation for a CBM well normally requires approximately five to seven people at a time, including personnel for logging and cementing activities. Each well would be drilled within a period of four to ten days. A well completion program may be initiated to stimulate production of gas and to determine gas and water production characteristics in preparation for production of gas from a drilled, cased, and cemented well. A mobile completion rig similar to the drill rig may be transported to the well site and used to complete each well. Completion operations are expected to average two to five days per well. Methane gas would be vented over the emergency pit or, rarely, flared and water temporarily discharged into the reserve pit for a short period of time during testing. If determined to be productive, wells would be shut-in until pipelines and other production facilities are constructed and any applicable permits obtained.

Depth of the water injection wells is expected to be approximately 6,000 feet. Drilling and completion of each injection well is expected to take approximately 7 to 14 days and installation of surface equipment, holding tanks and pumping equipment, an additional 14 days.

No use of materials or chemicals considered hazardous under Superfund Amendment and Reauthorization Act of 1986 as amended or the Resource Conservation and Recovery Act or extremely hazardous wastes as defined in 40 CFR 355 are proposed. Materials utilized for this project are identified in Table 2.3. Further details of the drilling operations and materials used for

1 Open-hole completion is the method used for dewatering and/or production of CBM that entails setting casing to the top of the coal seam but not through the coal seam.

drilling can be found in Appendix D, Drilling Plan.

TABLE 2.3 LOWER BUSH CREEK PROJECT HAZARDOUS MATERIALS

Materials utilized for each well during drilling operations					
Item	Use	Average Quantity Used per Well	Hazardous Chemicals	Chemical Categories	Extremely Hazardous Wastes
None					
Materials Used for Each Well During Completion Operations					
Item	Use	Average Quantity Used per Well	Hazardous Chemicals	Chemical Categories	Extremely Hazardous Wastes
None					
Expected Materials Used Annually for Production Operations Should Production Ensue					
Item	Use	Average Quantity Used per Well	Hazardous Chemicals	Chemical Categories	Extremely Hazardous Wastes
Fuel	Operate pump jack engine	N/A	Propane	Extremely Flammable	No

2.1.3 WELL COMPLETION AND PRODUCTION TESTING

Well completion methods isolate aquifers with surface and production casing to prevent condensates, gas and/or water movement from reservoir to reservoir and isolate the production zones. All well casing and cementing operations on these wells would be conducted in compliance with applicable rules and guidance and with BLM Onshore Oil and Gas Order No. 2.

Pumping units (pump jacks) would be used to draw water during the initial de-watering. Each pumping unit would run on propane until methane gas begins to flow, then would run on the methane gas. Pump units would be removed once the coal seam has been de-watered enough to allow testing of gas. Should methane gas production ensue, a covered wellhead and measurement devices would remain on the well pad.

Production testing has two phases. The first phase objective is water production, an indicator of well potential. After completion activities, each well would be allowed to flow water for up to 15 days to the reserve pit (pit designed to hold 30 days flow) to evaluate well performance. At no time would water be allowed to overflow the reserve pit. If this first phase of well performance indicates potential gas production, the well would be capped until injection wells and water gathering systems are completed. Each gas well could produce approximately 500 to 1,000 barrels of water daily, resulting in a total daily volume of 5,000 to 10,000 barrels being injected through each injection well.

The second phase objective is initiation of gas production. This phase requires continuation of de-watering and may last from a few months up to a year. During testing any produced gas would be vented over the emergency pit in accordance with BLM and WOGCC rules and regulations. This phase would also entail evaluation of the formation for fracture stimulation.

Venting or flaring at oil and gas facilities is regulated by two agencies, the Wyoming Department of Environmental Quality (WDEQ) and the Wyoming Oil and Gas Conservation Commission (WOGCC). Each agency regulates these activities with a slightly different objective. The WDEQ is concerned about the emission of regulated pollutants and the WOGCC is concerned about royalties of the vented gas. Both parties are concerned about safety of the public with regard to the venting of H_2S gas.

In general, venting CBM gas from a wellhead does not release any regulated pollutants. CBM gas is approximately 97% methane (CH_4), 2.5% ethane (C_2H_6), with remaining fractions of carbon dioxide (CO_2), and free nitrogen (N_2). Therefore, in general, no notification is required for the WDEQ for venting CBM gas from a wellhead. Flaring operation (combustion of the gas) does release regulated pollutants, however flaring is rarely performed. The WDEQ policy is to require verbal notification within 24 hours of the beginning of the episode. Notification is only required if the flare event emits more than 5 tons per year (TPY) of a regulated pollutant in a single event or 50 TPY annually. Using emissions factors published by the EPA in AP-42 Chapter 13, more than 82,000 standard cubic feet of gas (900 btu/scf) would have to be consumed in a single event or more than 820,000 standard cubic feet of gas would have to be consumed over an entire year for the notification thresholds to be met.

The WOGCC requires a retroactive notice of venting or flaring operations that persist for a period exceeding 15 days. This notice requests an authorization to continue flaring or venting.

No compression facilities are proposed at this time.

2.1.4 PRODUCED WATER DISPOSAL SYSTEM AND GAS PRODUCTION

Pumping units would be used for initial de-watering. Each pumping unit would run on propane and then on natural gas should the wells flow natural gas. Pumping units would be removed once the coal seam has been de-watered enough to allow testing of gas.

After completion each exploratory well could flow water for up to approximately 15 days to evaluate well performance. Produced water discharged to the reserve pit would not be allowed to exceed the capability of the pit to contain the water. Following the water flow-testing period, wells would be capped pending completion of the injection wells and associated water-gathering system. The target formation for produced water disposal is into a Fort Union sandstone containing water of lesser or equal quality. A number of sandstone lenses are found in this formation and it is expected that more than one would be tested for suitability for this use. There would be no surface discharge of water other than to the reserve pits, in accordance with BLM and WOGCC rules and regulations. In particular, the water injection wells would meet the requirements of the Underground Injection Control Program: Criteria and Standards, as amended; State Underground Injection Control Programs, State-administered program- Class II Wells, as amended, as regulated by WOGCC.

If the initial water production indicates commercial viability, injection wells would be drilled. Each

exploratory well would produce approximately 500 to 1,000 barrels of water daily, resulting in a total daily volume of 5,000 to 10,000 barrels being injected through each injection well.

Gathering systems for the produced water would link the wells to the injection wells by buried water lines in the utility corridors parallel to the access corridors. The total length of utility corridors to be constructed is approximately 14 miles. Refer to the project map (Figure 2.1) for utility corridor and injection well locations. Each pod would be serviced by one injection well. The utility corridors would parallel the access roads where possible. Refer to Appendix D for further details on rights-of-way for corridors.

During testing any gas flow would be vented over the emergency pit in accordance with BLM and WOGCC rules and regulations. Testing would also entail evaluation of the formation for fracture stimulation. The gas is primarily composed of methane, at an estimated 97% of total composition. The remaining constituents are dominated by ethane.

2.1.5 OPERATIONS AND MAINTENANCE

All operations would be conducted in accordance with industry standards for safe and efficient operation. All project roads and wells would be inspected periodically by Kennedy and the BLM and maintained by Kennedy to minimize any resource damage or loss and ensure safe operating conditions.

2.1.6 ANCILLARY FACILITIES

No ancillary facilities are planned.

2.1.7 WORKFORCE AND TRAFFIC

The expected traffic levels associated with the Proposed Action are addressed in Table 2.4 which provides a conceptual representation of types and maximum frequencies of typical traffic that could be expected during 'round-the-clock' drilling. The 'Trip Type' column lists the various service and supply vehicles associated with this type of activity and tends to demonstrate a maximum activity level. The 'Round-Trip Frequency' column includes the number of trips, both external (i.e., to/from each project area) and internal (within each project area).

TABLE 2.4
LOWER BUSH CREEK PROJECT TRAFFIC ESTIMATES

Proposed Action Traffic – General Estimates

Trip Type	Round-Trip Frequency
Drilling (1 rig, 2 crews/rig)	External (to/from Project Area)
Rig supervisor	1/day
Rig crews	2 vehicles/day/per drilling well
Engineers	2/week
Mechanics	1/week/per drilling well
Supply delivery	2/week/per drilling well

Proposed Action Traffic – General Estimates

Trip Type	Round-Trip Frequency
Drilling (1 rig, 2 crews/rig)	External (to/from Project Area)
Water truck	1/week
Mud trucks	1/week/per drilling well
Rig move	10 trucks/well
Drill bit/tool delivery	2/week
Completion	
Small truck mounted rig/crew	1/day/per completing well
Cement crew	3 trucks/2 trips/per completing well
Consultant	1/day
Well loggers	1 trip/well
Gathering systems construction	8/day
Power systems placement	2/day
Other field development	3/day
Testing and operations	2/day

2.1.8 RECLAMATION AND ABANDONMENT

The seed mixes for reclamation were recommended by the RSFO. Table 2.5 details the mixes to be used for the soil types found on the project area. Seeding rates are assumed for drill seeding. Seeding rates would be doubled if seed is broadcast. Standard success criteria would be based on attainment of total vegetation cover. Standard success criteria would be based on attainment of 50% of predisturbance cover in three years and 80% of predisturbance cover in five years. These identified seed mixes could be modified or added to by the BLM, as needed or required to meet the RSFO objectives for reclamation.

In the event drilling is non-productive at any given site, all disturbed areas associated with that site, including the well site and access road, would be reclaimed to the approximate landform existing prior to construction. Following construction, all areas not occupied by Proposed Action features would be reclaimed in the next growing season, or as directed by the agency. Remaining disturbed areas would be reclaimed following abandonment of project components. Stockpiled topsoil would be replaced as part of the seedbed preparation. Reclamation and site stabilization techniques would be applied as specified in the MSUP (see Appendix D). Clean-up would be ongoing throughout the project life.

TABLE 2.5
LOWER BUSH CREEK PROJECT PROPOSED SEED MIX

Species	**Variety**	**Drill Seeding Rate (lbs. Per acre pure live seed)**
General Seed Mixture		
Thickspike wheatgrass	Critana	3.0
Western wheatgrass	Rosanna	3.0
Indian ricegrass		3.0
Sandberg bluegrass		3.0
Blue flax		0.25
Winterfat		1.0
TOTAL		13.25
Sandy Sites Seed Mixture		

Species	Variety	Drill Seeding Rate (lbs. Per acre pure live seed)
Thickspike wheatgrass	Critana	4.0
Sandberg bluegrass		4.0
Indian ricegrass		4.0
Rocky Mountain penstemon		1.0
Shadscale		2.0
TOTAL		15.0
Saline/Sodic Soils Seed Mixture		
Western wheatgrass	Rosanna	3.0
Sandberg bluegrass		3.0
Indian ricegrass		3.0
Bottlebrush squirreltail		3.0
Rocky Mountain beeplant		1.0
Gardner saltbush		2.0
TOTAL		15.0

Any mulch applied to areas with high soil erosion potential or where use is otherwise indicated would be free from mold and noxious weed seeds. Site preparation may include ripping or chiseling to break up compacted soils, increase water penetration, promote root growth, and control erosion.

Implementation of the Proposed Action would result in surface disturbance. Estimates of the extent of that disturbance are found in Table 2.2. Turn-arounds and passing could result in full use of a 50-foot right-of-way on the right-of-way for the roadway and buried water gathering line paralleling the road. A full right of way could be 70 feet; however use of the full right of way would be rare and limited to the construction phase. Reclamation would likely be necessary on only 30 to 50 feet of that right of way. For the analysis, a 50-foot wide area of disturbance was assumed.

2.1.9 OTHER APPLICANT COMMITTED PRACTICES

2.1.9.1 AIR QUALITY

1. Kennedy would adhere to all applicable local, state, and federal air quality regulations and standards. Kennedy would adhere to all applicable ambient air quality standards, permit requirements (including preconstruction, testing, and operating permits), motorized equipment and other regulations, as required by the State of Wyoming, Department of Environmental Quality, Air Quality Division (WDEQ-AQD).

2. Kennedy would not allow burning garbage or refuse at well locations or other facilities. Any flaring would be conducted under the permitting provisions of Section 13 of the Wyoming Air Quality Standards and Regulations.

2.1.9.2 SOILS

1. Implement established BLM road standards practice to minimize offsite impacts and provide for the safety of operations.

2. Locate pipelines immediately adjacent to roads to avoid creating separate areas of disturbance and to reduce the total area of disturbance.

3. Frozen soils will not used as construction material.

4. Minimize construction activities in areas of steep slopes.

5. Design cut slopes in a manner that will allow retention of topsoil, use of surface treatment such as mulch, and subsequent revegetation.

6. Six inches of topsoil will be salvaged from all disturbed areas.

7. Where possible, minimize disturbance to vegetated cuts and fills on existing improved roads.

8. Install runoff and erosion control measures such as water bars, berms, and interceptor ditches if needed.

9. Install culverts for ephemeral and intermittent drainage crossings.

10. Upon completion of construction activities not specifically required for production operations, restore topography to near pre-existing contours at the well sites, along access roads and pipelines, and other facilities sites; replace up to six inches of topsoil or suitable plant growth material over all disturbed surfaces; apply fertilizer as required; seed; and mulch.

2.1.9.3 WATER RESOURCES

Other mitigation measures listed in the Soils, and Vegetation and Wetlands sections of this EA would also apply to Water Resources.

1. Limit construction of all drainage crossings to no-flow periods or low-flow periods.

2. Minimize the area of disturbance within drainage channel environments.

3. Prohibit construction of well sites and other non-linear features within 500 feet of surface water and/or riparian areas. Possible exceptions to this will be granted by the BLM for linear features based on an environmental analysis and site-specific mitigation plans.

4. Construct channel crossings by pipelines such that the pipe is buried a minimum of four feet below the channel bottom.

5. Case wells during drilling and case and cement all wells in accordance with Onshore Order No. 2 to protect all high quality water aquifers. High quality water aquifers are aquifers with known water quality of 10,000 TDS or less. Include well casing and welding of sufficient integrity to contain all fluids under high pressure during drilling and well completion. Wells will adhere to the appropriate BLM cementing policy.

6. Construct the reserve pits in cut rather than fill materials. Compact and stabilize fill material, as needed. Inspect the subsoil material of the pit to be constructed in order to assess soil stability and permeability and determine whether reinforcement is required. The reserve pit will be lined with reinforced synthetic liner at least 12 mils in thickness with a bursting strength of 175 x 175 pounds per inch (ASTMD 75179) or according to stipulation.

7. Maintain one foot of freeboard on all reserve pits to minimize the risk of overflowing. Shut down drilling operations until the problem is corrected if leakage is found outside the pit.

8. Extract hydrostatic test water used in conjunction with pipeline testing and all water used during construction activities from sources having sufficient quantities and appropriation permits approved by the State of Wyoming.

9. No crossings or encroachments of waters of the U.S., as defined by the U.S. Army Corps of Engineers (COE), are planned in association with this project. The Great Divide Basin is hydrographically closed and has been determined by the COE not to contain any waters of the U.S. that will fall under their jurisdiction. The COE has reviewed the scoping notice for the Proposed Action. Based on the information provided and the Court ruling, it has been determined that any wetlands or other waters in the project area are isolated and are no longer considered to be 'waters of the U.S.' under Section 404 of the Clean Water Act (COE March 22, 2002 response to T Deakins, re scoping notice for Kennedy Oil Pilot Exploratory Coal Bed Methane Project).

   Any changes in the produced water disposal method or location must have written approval from the BLM before the changes take place.

2.1.9.4 NOISE

1. Muffle and maintain all motorized equipment according to manufacturers' specifications.

2. In any area of operations (drill site, etc.) where noise levels may exceed federal OSHA safe limits, Kennedy will provide and require the use of proper personnel protective equipment by employees. No compression facilities are proposed for this project.

2.1.9.5 TRANSPORTATION

1. Existing roads will be used whenever possible. Standards for road design will be consistent with BLM guidance.

2. Roads not required for routine operation and maintenance of producing wells and ancillary facilities will be reclaimed and revegetated.

3. Areas with important resource values, steep slopes, and fragile soils will be avoided.

4. Kennedy will be responsible for preventive and corrective maintenance of roads in the project area throughout the duration of the Proposed Action. This may include shallow grading, cleaning ditches and drainage facilities, dust abatement, noxious weed control, or other requirements as directed by the BLM or the Sweetwater County Road and Bridge Department.

5. Except in emergency situations, access will be limited to drier conditions to prevent severe rutting (creation of ruts in excess of 4" deep) of the road surface. Culverts will be installed where needed to allow drainage in all draws and natural drainage areas. Onsite reviews will be conducted with BLM personnel for approval of proposed access prior to any construction.

2.1.9.6 HEALTH AND SAFETY

Measures listed under Air Quality and Water Quality also apply to Health and Safety.

1. Sanitation facilities installed on the drill sites and any resident campsite locations will be approved by the WDEQ and authorized officer.

2. To minimize undue exposure to hazardous situations, the operator will comply with all existing applicable rules and regulations (i.e., Onshore Orders, OSHA requirements, etc.) that will preclude the public from entering hazardous areas and place warning signs alerting the public of truck traffic, if required by the BLM.

3. Haul all garbage and rubbish from the drill site to a state-approved sanitary landfill for disposal. Collect and store any garbage or refuse materials on location prior to transport in containers approved by the BLM.

4. Spill Prevention Control and Countermeasure Plans will be written and implemented as necessary, in accordance with 40 CFR 112.

   Spills of oil, gas, or any other potentially hazardous substance will be reported immediately to the BLM, and will be mitigated immediately, as appropriate, through cleanup or removal to an approved disposal site.

2.1.9.7 VEGETATION/WETLANDS/NOXIOUS WEEDS

Other mitigation measures under Soils and Water Resources of this EA will also apply to vegetation and wetlands.

1. File noxious weed monitoring forms with the BLM and implement, if necessary, a weed control and eradication program.

2. Evaluate all project facility sites for occurrence and distribution of waters of the U.S., special aquatic sites, and jurisdictional wetlands. All project facilities will be located out of these sensitive areas. If complete avoidance is not possible, minimize impacts through modification

and minor relocations.

3. On BLM-administered public lands, an approved Pesticide Use Proposal will be obtained before the application of herbicides or other pesticides for the control of noxious weeds.

4. Disturbed areas will be seeded and stabilized in accordance with BLM-approved reclamation guidelines.

2.1.9.8 WILDLIFE AND FISHERIES

No fisheries mitigation is needed beyond that indicated under Water Resources and Special Status Species.

1. During reclamation, establish a variety of forage species that will return the land to a condition approximate or equal to that which existed prior to disturbance.

2. Prohibit unnecessary off-site activities of operational personnel in the vicinity of the drill sites. Inform all project employees of applicable wildlife laws and penalties associated with unlawful take and harassment. Minimize surface disturbance.

3. No construction is planned in big game crucial winter range at any time. No crucial winter range is identified in the project area.

4. Conduct a raptor survey within 1 mile of the project activity areas prior to construction if activities will be conducted between February 1 and July 31. No permanent above ground structures will be constructed within 825 feet of an active raptor nest (NSO).

5. Surface-disturbing activities will be seasonally restricted from February 1 through July 31 within a 0.5-mile radius of all active raptor nests, except for Ferruginous Hawk nests, which will have a 1.0-mile seasonal buffer. Active nests are described as any active within the past 3 years. Such restriction will not apply to routine maintenance activities. When an "active" raptor nest is within ½ to 1 mile (depending on species and line of sight) of a proposed well site, restrict construction during the critical nesting season for that species. For listed and BLM sensitive species the distance should be increased to within one mile of a proposed well site. See Chapters 3 and 4 for details. No above ground structures or roads are allowed to be constructed within 825 feet of any raptor nest (Wyoming BLM State Guidelines).

6. Protection for breeding Greater Sage-Grouse will include No Surface Occupancy within 0.25 mile of a lek. Construction of low profile facilities or performance of temporary disruptive activities will be avoided where possible, but exceptions may be requested from the authorizing officer, in accordance with the GRRMP ROD.

   Protection for Greater Sage-Grouse nesting habitat within appropriate distances from leks will include avoidance of such habitat and/or restriction of seasonal activities within those areas. Such restrictions may apply to suitable nesting habitat up to two miles from the lek from

February 1 through July 31. The time frames will be assessed on a case-by-case basis by the RSFO, in accordance with the GRRMP ROD. Exceptions may be granted if the activity will occur in unsuitable nesting habitat.

7. Mountain plover will be protected by restricting or avoiding construction activities in mountain plover nesting and brood-rearing habitat during breeding periods (April 10 through July 10). Seed mixes for plants 6 inches high or less will be used in mountain plover habitat, or as otherwise directed by an authorized officer. Sightings of Mountain Plover will be reported to the BLM. Observances of mountain plover nest, eggs, or chick will be immediately reported to the BLM and USFWS. Few structures amenable to raptor perching are proposed. Noise reduction measures will be implemented in this project. See Chapters 2, 3, and 4 for details. Exceptions may be requested from the authorizing officer, in accordance with the GRRMP ROD.

8. If sodium levels reach 17,000 ppm or more, reserve pits will be netted to protect migratory birds.

9. If threatened, endangered, candidate, or proposed species are discovered at any time during construction, all construction activities will halt and the BLM will be immediately notified. Work will not resume until a Notice to Proceed is issued by the BLM.

2.1.9.9 CULTURAL AND HISTORIC RESOURCES

Kennedy has completed Class III cultural inventories of all previously uninventoried parcels of land that will have surface disturbance associated with the Proposed Action.

1. If cultural resources are discovered at any time during construction, all construction activities will halt and the BLM will be immediately notified. Work will not resume until a Notice to Proceed is issued by the BLM.

2.1.9.10 SOCIOECONOMICS

1. Implement hiring policies that will encourage the use of local or regional workers who will not have to relocate to the area.

2. Coordinate project activities with ranching operations to minimize conflicts involving livestock movement or other ranch operations. Establish effective and frequent communication with affected ranchers to monitor and correct problems and coordinate scheduling.

2.2 NO ACTION ALTERNATIVE

Regulations found in 40 CFR 1502.14(d) require that the alternatives analysis include the alternative of no action. Under this alternative (and for the purpose of this analysis) the No Action Alternative means the Proposed Action would be denied. If any future activity were proposed on these leases, it would be subject to RMP conformance review including best management practices and standard operating procedures, and NEPA requirements in effect at the time.

Mineral activity would be allowed to continue by the BLM in the general area although the oil and gas lessee or their operator, contractor or sub-contractors would not be permitted to commence any activity upon the lease other than surveying and staking well and road locations, and inventorying for certain resource values (i.e., cultural, listed species, etc.). All proposals are subject to appropriate level of environmental analysis per the procedural provisions under NEPA.

An oil and gas lease grants the lessee the "right and privilege to drill for, mine, extract, remove and dispose of all oil and gas deposits" in the leased lands, subject to the terms and conditions incorporated in the lease (Form 3110-2). Because the Secretary of the Interior has the authority and responsibility to protect the environment within federal oil and gas leases, restrictions are imposed on the lease terms. Leases within the project area contain various stipulations concerning surface disturbance, surface occupancy and limited surface use. In addition, the lease stipulations provide that the USDI may impose "such reasonable conditions, not inconsistent with the purposes for which [the] lease is issued, as the [BLM] may require to protect the surface of the leased lands and the environment." None of the stipulations contained in the existing leases, however, empower the Secretary of the Interior to deny all drilling activity because of environmental concerns.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

In accordance with 40 CFR 1502.14(a), the BLM is required to explore and evaluate all reasonable alternatives. The following alternatives were considered by the BLM but found to be unreasonable for reasons provided. Thus, these alternatives were eliminated from detailed study.

No Upgrade or Construction of Roads. This alternative was based on the Proposed Action with no allowance for upgrading of existing roads or construction of roads. Such an alternative would reduce surface disturbance caused by road upgrading or construction. However, the GRRMP requires roads to be constructed according to BLM standards to protect the health and safety of those working on or visiting public lands in the area. The GRRMP states:

> "Roads would be constructed as described in BLM Manual 9113. Where necessary, running surfaces of the roads would be graveled if the base does not already contain sufficient aggregate…." (BLM 1997, Appendix 5-1, p. 159)

An alternative of not allowing road upgrade or construction would not be in conformance with the existing land use plan and would not meet BLM standards for road construction or public health and safety.

Alternative of Ninety-three wells in 2 pods: In September 2001 when Kennedy first approached BLM, their tentative proposal consisted of 93 wells, located in two pods, to test the viability of CBM production. The two pods included 35 wells including 3 injection wells in T24NR98W and 58 wells including 4 injection wells in T25N, R 97/98W. However, bids to write the document were considerably higher than the company wanted to pay; thus, Kennedy chose to scale their proposal down to the minimum necessary to test CBM production. Hence, the Proposed Action was developed. Because Kennedy found the

cost to complete the necessary study to be uneconomic and modified their proposal, this alternative was drop from detailed study.

Directional or Horizontal Drilling Method Alternative: Directional drilling refers to a technique of drilling on an angle from the vertical that allows the completion of multiple wells from one drill pad. The success of this method is dependent on well depth, gas pressure and down-hole pump needs. Directional drilling is generally used to gain access to a part of an oil and/or gas reservoir that is not directly below the surface well location. It is also generally used in areas where surface locations are expensive or prohibitive. Multiple wells can be drilled directionally from one surface location. Directional drilling is used extensively offshore. In remote areas such as the Middle East, Alaska's North Slope, or offshore, mobilization and site preparation costs are much higher than in the pilot project area. In these remote areas directional drilling is often justified from an economic standpoint.

One comment letter referred to the study done by the U.S. Bureau of Mines (Baker, et al. 1984) to test the feasibility of directional drilling for coal bed methane gas. This study involved drilling three lateral drains in anthracite coal in the Emerald Mine area in Pennsylvania. Anthracite coal is much denser and probably has substantially higher gas content than the sub bituminous coal in the pilot project area. The well drilled in the Bureau of Mines study also had significant mechanical problems. The report by Baker, et al. (1984, p. 2) states "However, little gas has been produced from the Emerald Mine directional hole because of caving of the horizontal holes drilled in shale near the bottom of the casing." Baker, et al. (1984) assumed a gas production rate and price to do an economic evaluation. A 25 percent rate of return, after taxes, was calculated. The economic analysis is detailed but does not include severance and ad valorem taxes, or landowner royalty. In Wyoming, taxes and royalty payments on federal leases total about 25 percent of gross revenue. Also, gas compression costs were estimated for compression to only 30 pounds per square inch gage pressure (psig). In the pilot area, produced gas could need to be compressed to about 500 to 900 psig. This would cost about $0.15/MCFG or about 7.5 percent of the gross sales price (assuming $2.00/MCFG). Overall, the evaluation by Baker, et al. (1984) bears little relevance to the geologic and economic conditions found in southwest Wyoming. The study by Baker, et al. (1984) does not indicate that directional nor horizontal drilling would be economically feasible in the project area.

Horizontal drilling is a method of completing a well with a long horizontal wellbore segment in the target formation. This method has been used extensively to increase hydrocarbon recovery from low permeability fractured reservoirs. Although the density of horizontal wells may be less than the density of vertical wells, usually only one horizontal well is drilled from each surface location. Horizontal drilling has been used extensively to develop low permeability fractured oil and gas reservoirs in Texas, North Dakota, and southeast Wyoming. In all three of these areas vertical wells were drilled initially.

The purpose of a pilot project, such as the one proposed by Kennedy, is to gather data and determine the economic feasibility of more extensive development. At this stage, it would be very difficult to evaluate the feasibility of directional drilling, or horizontal completion techniques in the Kennedy project area as little data or information is available. Requiring directional drilling or horizontal completions would complicate the Kennedy pilot project in that the purpose of the pilot project is to

collect reliable information on reservoir heterogeneity, coal thickness, coal gas content, gas chemistry, recovery efficiency, coal permeability, water quality and quantity, plus drilling, completion, and processing costs. This data must be collected before an assessment of the feasibility of drilling directional wells from a central location or using horizontal completions can be properly evaluated. Neither directional nor horizontal drilling methods have been successful in low-pressure coal bed methane wells, as is the character of the Big Red Coal. Due to these factors, a directional or horizontal drilling program was found to be unreasonable.

2.5 SUMMARY OF ENVIRONMENTAL IMPACTS

A summary of impacts and mitigations for the Proposed Action and No Action analyzed in this EA is provided in Table 2.7. A detailed analysis of project impacts and mitigation measure is presented in Chapter 4.

TABLE 2.6
LOWER BUSH CREEK PROJECT
SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

RESOURCE	PROPOSED ACTION	NO ACTION	MITIGATION
Air Quality	Temporary short-term construction-related increases in dust and exhaust emissions.	No change from current situation. Impacts to air quality could occur due to other, proposed and on-going activities.	Implement dust suppression during construction; properly maintain construction equipment; promptly reclaim
Topography and Physiography	No or minimal changes in topography due to cuts and fills.	No change from current situation.	Avoid steep slopes; properly reclaim
Geology and Geologic Hazards	No Impacts expected to geology or geologic hazards	No change from current situation.	Minimize disturbance or avoid sensitive areas; promptly reclaim
Paleontology	No Impacts anticipated.	Impacts could occur from other proposed and on-going activities.	Notify BLM of any discoveries
Mineral Resources	Depletion of natural gas resources.	Impact to the lease holder if Proposed Action denied.	Promote efficient recovery of natural gas resources
Soils	Disturbance of up to 85 acres of previously undisturbed soils. Increase erosion and other surface damage should Special Purpose roads fail	No change from current situation. Impacts to soils could occur due to other proposed and on-going activities.	Minimize disturbance; implement soil erosion practices until sites are permanently reclaimed; promptly stabilize and reclaim; appropriate road and well location design and maintenance. Monitor construction and use of Special Purpose roads.
Water resources	No direct impacts to springs, seeps, or usable ground water. Increased	No change from current situation. Impacts to water resources could occur due to	Avoid channel crossings; construction in channels during periods of no or low flow; prompt

RESOURCE	PROPOSED ACTION	NO ACTION	MITIGATION
	runoff from insufficiently designed roads could reach local waterways.	other proposed and on-going activities.	stabilization and reclamation; appropriate road and well location design and maintenance. Monitor construction and use of Special Purpose roads.
Noise	Temporary construction-related increases in noise	No change from current situation. Impacts from noise could occur due to other proposed and on-going activities.	Properly muffle all construction equipment.
Vegetation and Wetlands	Disturbance of up to 85 acres previously undisturbed vegetation. Potential for additional disturbance to vegetation should insufficiently designed roads fail. Potential for invasive species to become established.	No change from current situation. Impacts to vegetation and wetlands could occur due to other, proposed and on-going activities.	Minimize disturbance; implement noxious weed controls; allow no disturbance to wetlands; prompt revegetation with native, adapted species; appropriate road and well location design and maintenance. Monitor construction and use of Special Purpose roads.
Wildlife and Fisheries	Direct effects from collision-related mortality; direct/indirect effects from 85 acres of habitat alteration; temporary displacement particularly during construction.	No change from current situation. Impacts to wildlife and fisheries could occur due to other, proposed and on-going activities.	Comply with all seasonal stipulations and applicant committed measures for wildlife protection unless otherwise authorized by the BLM; minimize disturbance; promptly reclaim
Wild Horses	Temporary disruption of up to 85 acres of habitat use	No change from current situation. Impacts to wild horses could occur due to other, proposed and on-going activities.	Prompt reclamation
Threatened, Endangered, Proposed and Candidate, (TEP&C) Species, and Sensitive Animal and Plant Species	No adverse effects to TEP&C species; possible direct effects (e.g., collision-and/or construction-related morality) on certain state-sensitive species or inadvertent destruction of sensitive plants	No change from current situation. Impacts to TEP&C species could occur due to other, proposed and on-going activities.	Complete surveys and consultation with U.S. Fish and Wildlife Service prior to construction; avoid sensitive species habitats where practical
Cultural Resources	Added knowledge and information about cultural resources of the area; buried sites or artifacts could be disturbed or	Loss of knowledge and information about cultural resources of the area. Impacts to cultural resources could occur due to other	Complete surveys of all areas to be disturbed; avoid or mitigate NRHP-eligible sites where practical; mitigate possible impacts on a case-by-case basis through the NHPA

RESOURCE	PROPOSED ACTION	NO ACTION	MITIGATION
	destroyed	proposed and on-going activities.	Section 106 consultation process. Monitor construction.
Socioeconomic /Environmental Justice	Temporary beneficial economic impacts to local and state economics during construction and drilling; if production occurs, long term benefits from collection of royalty and taxes; no impacts to environmental justice	Loss of positive economic benefits. Impacts to economic situation could occur due to other proposed and on-going activities.	Hire workers locally as available
Landownership and Use	No change in landownership; temporary loss of grazing forage and wildlife habitat; decreased recreation in immediate area.	No Change. Use of lands could be impacted due to other proposed and on-going activities.	Prompt stabilizing after construction and reclamation of disturbed areas
Health and Safety	Proposed roads could result in injury, damaged resources, or equipment if roads are used during wet periods.	No change.	Roads should be designed by or under the direction of a licensed engineer.
Aesthetic and Visual Resources	Temporary visual impacts during construction; no long-term impacts requiring re-categorization of existing Visual Resource management classification	No change from current situation. Impacts to VRM could occur due to other, proposed and on-going activities.	Minimize disturbance; prompt stabilization and reclamation of disturbed areas; painting aboveground features to blend with the surrounding landscape